REMARKS

In view of the rejection, RCE has been filed, wherein claim 1-7 have been canceled and claim 8 and 9 have been added to clarify the features of the invention.

Claim 8 is directed to the embodiment as shown in Fig. 3. Namely, a gas chromatograph in claim 8 comprises a flow path, a control valve situated in the flow path and being capable of adjusting an opening degree thereof, a flow resistance provided in the flow path at a downstream side of the control valve, a sample introducing part provided in the flow path at a downstream side of the flow resistance, differential pressure detecting means attached to the flow path for detecting a differential pressure between two ends of the flow resistance, pressure detecting means attached to the flow path between the flow resistance and the control valve for detecting a pressure thereat, and control means attached to the control valve, the differential pressure detecting means and the pressure detecting means for carrying out a predetermined calculation based on signals from the differential pressure detecting means and the pressure detecting means for controlling the opening degree of the control valve so that flow amount or pressure in the flow path can be controlled at a predetermined value by the differential pressure detecting means and the pressure detecting means.

In the invention, it is important that the control valve regulates the pressure based on values of the differential pressure detecting means and the pressure detecting means. This invention enables to calculate and control both a flow amount and pressure in the flow path by applying a formula (1) and p1(a pressure between the flow resistance and the control valve)-$\Delta$p(a differential pressure between two ends of the flow resistance) in the specification. The invention also can be used to control the flow amount and pressure precisely with less components.

In connection with a rejection based on APA as shown in Fig. 4, a ground for the rejection is that APA only lacks a pressure detecting means in between the control valve and the flow resistance (the differential pressure detecting means). In Fig. 4, a flow path does not have a pressure detecting means, but a sample introducing part is directly connected to a pressure sensor 19. A valve 16 controls the opening degree and flow amount in the flow path at a predetermined value by the differential pressure detecting means 15 and the pressure detecting means 19. Compared to APA, in the invention, the pressure detecting means is not situated at the sample introducing part, but in between the control valve and the differential pressure detecting means. Generally, it is believed that a pressure at an upstream side of a flow resistance is higher than a downstream side, and a pressure can be detected more precisely when the pressure is relatively high. In this sense, the invention should be considered as substantially more effective because of a fact that the pressure detecting means is located between the control valve and the differential pressure detecting means, so that the pressure value detected by the pressure detecting means is high enough to detect and control precisely.

For a better understanding, experiments have been carried out under a typical condition (A flow resistance: Ø =0.1 mm x 17 mm, A pressure at a downstream of a flow resistance: 50 kPa, A flow amount: 50 ml/min). The experiments show that a pressure at an upstream of the flow resistance is 108 kPa under this condition. A full-scale of a pressure sensor ranges up to 700 kPa (It is necessary to use high pressure on a sample column for a high speed analysis device). In this pressure sensor, 108 kPa can be more precisely detected than detecting the pressure of 50 kPa. Therefore, it can be reasonably said that it is more ideal to detect 108 kpa instead of 50 kPa in order to control both flow

amount and pressure precisely by the formula (4) in the specification. Accordingly, it is better to locate the pressure sensor at the upstream side of the differential pressure sensor.

Regarding a rejection based on Shoji, it is said that Shoji discloses a constitution where a pressure sensor is situated away from a control valve, and this limitation includes all locations of the pressure sensor along the flow path including that between the flow resistance and the control valve for detecting a pressure thereat, as claimed in the invention.

However, the invention should be considered as substantially different and effective in terms of that the control valve is situated at an upstream side of the pressure detecting means and the differential pressure detecting means in order to apply both flow amount control and pressure control.

In Shoji, the control valve 5 can control a flow amount, but can not control a flow pressure because a control valve usually lowers a pressure and makes it impossible to control a flow pressure at the sample introducing part.

Therefore, it can be said that it is important to have a flow resistance at a downstream of a control valve and a pressure detecting means at an upstream of a flow resistance in order to control both flow amount and pressure. Needless to say, this object cannot be achieved only by having a pressure sensor that is situated away from the control valve or in between the flow resistance and the control valve.

AS to the rejection based on Wang, it is said that the fact that the pressure sensor is situated at an upstream side of a flow sensor in stead of a downstream side is merely regarded as a design expedient that provides no new and/or unexpected result over those features disclosed in Wang. It is also said that the flow sensor is equivalent to a combination of a flow resistance and a pressure detecting means.

However, Wang only disclosed that the flow sensor controls the opening degree of control valve 414. The flow sensor 41b disclosed by Wang is "temperature and pressure compensated flow sensor (column 4, line 20). Wang does not disclose or imply that the flow sensor consists of a flow resistance and a pressure sensor. Furthermore, Wang does not imply that a flow pressure was controlled based on signals from a pressure sensor like the invention does.

As stated above, it is essential to have the pressure detecting means at an upstream of the differential pressure detecting means to detect the pressure precisely. In this sense, Wang's description about the flow sensor is not able to fully disclose or imply the invention.

Lastly, with respect to the rejection based on the reference, JP8-101176, it is said that JP8-101176 discloses a pressure sensor (1b) disposed between the control valve (1a) and the flow resistance (2a) for the purpose of providing a value of the pressure thereat.

However, the control valve 1a is technically not equivalent to the control valve in the invention because the control valve 1a in the reference is a part of a pressure regulator 1 and controlled only by signals from a pressure sensor 1b. In the reference, the pressure regulator 1 and a differential pressure control unit 2 are separately controlled, and those two parts function as a mass flow controller by adjusting another control valve 2c, situated at a downstream side of a control valve 1a. In short, valve 1a merely adjusts the opening degree based on a value of the pressure sensor 1b, and is a completely different control method.

Therefore, the invention should be distinguished from the references based on a fact that the control valve regulates based

on the differential between a value of the differential pressure detecting means and the pressure detecting means.

Reconsideration and allowance are earnestly solicited.

Respectfully submitted,

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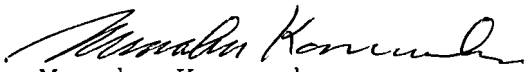

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